WHAT IS CLAIMED IS:

1. A method of plasma-enhanced cleaning of a batch-type processing system, the method comprising performing a cleaning process, including:

introducing a cleaning gas in a process chamber of the batch-type processing system, the process chamber having a material deposit on at least one surface therein;

forming a plasma by applying power to a system component within the process chamber, the system component selected from the group consisting of: a substrate holder for holding a plurality of substrates, a substrate holder support for supporting the substrate holder, or a process tube;

exposing the material deposit in the process chamber to the plasma to form a volatile reaction product; and

exhausting the reaction product from the process chamber.

2. The method according to claim 1 further comprising monitoring a signal from the processing system, the signal being indicative of the progress of the cleaning process, and based upon the signal, performing one of the following:(a) continue performing the cleaning process and continue monitoring; or (b) stopping the cleaning process.

3. The method according to claim 2 wherein the monitoring further comprises determining if an intensity level of the signal has reached a threshold value.

4. The method according to claim 3, wherein performing (b) occurs after determining that the threshold value has been reached.

5. The method according to claim 2, wherein the monitoring comprises using an optical monitoring system to detect light emission or light absorption of a gas in the process chamber.

6. The method according to claim 2, wherein the monitoring comprises using an optical monitoring system to detect interaction of light with at least one of the system component or the material deposit.

7. The method according to claim 2, wherein the monitoring comprises using a mass sensor to detect a mass signal of a gas in the process chamber.

8. The method according to claim 1, wherein the introducing further comprises flowing at least one of ClF_3, HF, HCl, F_2, NF_3, and CF_4 into the process chamber.

9. The method according to claim 8, wherein the introducing further comprises flowing at least one Ar, He, Ne, Kr, Xe, and N_2.

10. A method of plasma-enhanced cleaning of a batch-type processing system, the method comprising:

performing a cleaning process, including:

introducing a cleaning gas in a process chamber of the batch-type processing system, the process chamber having a material deposit on at least one surface therein,

forming a plasma by applying power to a system component within the process chamber,

exposing the material deposit in the process chamber to the plasma to form a volatile reaction product, and

exhausting the reaction product from the process chamber;

monitoring a signal from the processing system, the signal being indicative of the progress of the cleaning process; and

based upon the signal, performing one of the following:

(a) continue performing the cleaning process and continue monitoring; or (b) stopping the cleaning process.

11. The method according to claim 10 wherein the monitoring further comprises determining if an intensity level of the signal has reached a threshold value.

12. The method according to claim 11, wherein performing (b) occurs after determining that the threshold value has been reached.

13. The method according to claim 10, wherein the monitoring comprises using an optical monitoring system to detect light emission or light absorption of a gas in the process chamber.

14. The method according to claim 10, wherein the monitoring comprises using an optical monitoring system to detect interaction of light with at least one of the system component or the material deposit.

15. The method according to claim 10, wherein the monitoring comprises using a mass sensor to detect a mass signal of a gas in the process chamber.

16. The method according to claim 10, wherein the introducing further comprises flowing at least one of ClF_3, HF, HCl, F_2, NF_3, and CF_4 into the process chamber.

17. The method according to claim 16, wherein the introducing further comprises flowing at least one Ar, He, Ne, Kr, Xe, and N_2.

18. A batch-type processing system, comprising:

a process chamber containing a material deposit on at least one surface therein;

an electrode that is a system component within the process chamber and that is selected from the group consisting of: a substrate holder for holding a plurality of substrates, a substrate holder support for supporting the substrate holder, or a process tube;

a gas injection system configured for introducing a cleaning gas in the process chamber;

a plasma source configured for forming plasma in the process chamber by applying power to the electrode, wherein the plasma is capable of reacting with the material deposit to form a volatile reaction product;

a vacuum pumping system configured for exhausting the reaction product from the process chamber; and

a controller configured to control the processing system.

19. The processing system according to claim 18, further comprising a chamber monitoring system configured for monitoring a signal from the processing system to determine cleaning status of the processing system and configured to transmit the status to the controller, and wherein the controller is further configured to receive the status and to control the processing system in response to the status.

20. The processing system according to claim 19, wherein the chamber monitoring system is further configured to determine if an intensity level of the signal has reached a threshold value, and based on the determination, either continue with the process or stop the process.

21. The processing system according to claim 19, wherein the chamber monitoring system comprises an optical monitoring system to detect light emission or light absorption of a gas in the process chamber.

22. The processing system according to claim 19, wherein the chamber monitoring system comprises an optical monitoring system to detect interaction of light with at least one of the system component or the material deposit.

23. The processing system according to claim 19, wherein the chamber monitoring system comprises a mass sensor to detect a mass signal in the process chamber.

24. The processing system according to claim 18, wherein the electrode is the process tube and the plasma source comprises a RF generator and a match network coupled to the process tube.

25. The processing system according to claim 18, wherein the plasma source comprises a RF generator and a match network coupled to the system component within the process tube.

26. The processing system according to claim 18, wherein the plasma source is configured for applying RF power to multiple sections of the substrate holder in the process chamber.

27. The processing system according to claim 26, wherein the substrate holder further contains multiple dummy wafers.

28. The processing system according to claim 18, wherein the system component comprises at least one of quartz, Al_2O, SiN, and SiC, doped silicon, SiC–coated graphite, and Si-coated graphite.

29. The processing system according to claim 18, wherein the material deposit comprises at least one of Si, SiGe, SiN, SiO_2, doped Si, HfO_2, $HfSiO_x$, ZrO_2, and $ZrSiO_x$.

30. The processing system according to claim 18, wherein the gas injection system is configured for introducing at least one of ClF_3, HF, HCl, F_2, NF_3, and CF_4 in the process chamber.

31. The processing system according to claim 30, wherein the gas injection system is further configured for introducing at least one of Ar, He, Ne, Kr, Xe, and N_2 in the process chamber.

32. A batch-type processing system, comprising:

a process chamber containing a material deposit on at least one surface therein;

a system component within the process chamber;

a gas injection system configured for introducing a cleaning gas in the process chamber;

a plasma source configured for forming plasma in the process chamber by applying power to the system component, wherein the plasma is capable of reacting with the material deposit to form a volatile reaction product;

a vacuum pumping system configured for exhausting the reaction product from the process chamber;

a chamber monitoring system configured for monitoring a signal from the processing system to determine cleaning status of the processing system and to transmit the status; and

a controller configured to receive the status from the chamber monitoring system and to control the processing system in response to the status.

33. The processing system according to claim 32, wherein the chamber monitoring system is further configured to determine if an intensity level of the signal has reached a threshold value, and based on the determination, either continue with the process or stop the process.

34. The processing system according to claim 32, wherein the chamber monitoring system comprises an optical monitoring system to detect light emission or light absorption of a gas in the process chamber.

35. The processing system according to claim 32, wherein the chamber monitoring system comprises an optical monitoring system to detect interaction of light with at least one of the system component or the material deposit.

36. The processing system according to claim 32, wherein the chamber monitoring system comprises a mass sensor to detect a mass signal in the process chamber.

37. The processing system according to claim 32, wherein the process chamber comprises a process tube and the plasma source comprises a RF generator and a match network coupled to the process tube.

38. The processing system according to claim 32, wherein the process chamber comprises a process tube and the plasma source comprises a RF generator and a match network coupled to the system component within the process tube.

39. The processing system according to claim 32, wherein the plasma source is configured for applying RF power to multiple sections of a substrate holder in the process chamber.

40. The processing system according to claim 39, wherein the substrate holder further contains multiple dummy wafers.

41. The processing system according to claim 32, wherein the system component comprises at least one of a process tube, a shield, a ring, a baffle, a gas injector, a substrate holder, a substrate holder support, a cap cover, and a liner.

42. The processing system according to claim 32, wherein the system component comprises at least one of quartz, Al_2O, SiN, and SiC, doped silicon, SiC–coated graphite, and Si-coated graphite.

43. The processing system according to claim 32, wherein the material deposit comprises at least one of Si, SiGe, SiN, SiO_2, doped Si, HfO_2, $HfSiO_x$, ZrO_2, and $ZrSiO_x$.

44. The processing system according to claim 32, wherein the gas injection system is configured for introducing at least one of ClF_3, HF, HCl, F_2, NF_3, and CF_4 in the process chamber.

45. The processing system according to claim 44, wherein the gas injection system is further configured for introducing at least one of Ar, He, Ne, Kr, Xe, and N_2 in the process chamber.